Mountain erosion over 10 yr, 10 k.y., and 10 m.y. time scales

James W. Kirchner - Department of Earth and Planetary Science, University of California, Berkeley, California 94720-4767, USA (kirchner@seismo.berkeley.edu).

Robert C. Finkel - Center for Accelerator Mass Spectrometry, Lawrence Livermore National Laboratory, Livermore, California 94550, USA

Clifford S. Riebe - Department of Earth and Planetary Science, University of California, Berkeley, California 94720-4767, USA

Darryl E. Granger - Department of Earth and Atmospheric Sciences, Purdue University, West Lafayette, Indiana 47907-1397, USA

James L. Clayton

John G. King - Rocky Mountain Experiment Station, U.S. Department of Agriculture Forest Service, Boise, Idaho 83702, USA

Walter F. Megahan - National Council for Air and Stream Improvement, Sequim, Washington 98382, USA

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ABSTRACT

The authors used cosmogenic 10Be to measure erosion rates over 10 k.y. time scales at 32 Idaho mountain catchments, ranging from small experimental watersheds (0.2 km2) to large river basins (35 000 km2).

These long-term sediment yields are, on average, 17 times higher than stream sediment fluxes measured over 10–84 yr, but are consistent with 10 m.y. erosion rates measured by apatite fission tracks. The results imply that conventional sediment-yield measurements - even those made over decades - can greatly underestimate long-term average rates of sediment delivery and thus overestimate the life spans of engineered reservoirs. The observations also suggest that sediment delivery from mountainous terrain is extremely episodic, sporadically subjecting mountain stream ecosystems to extensive disturbance.